

at right angles with the disk, and at others laid so closely upon it as to be with difficulty detected. Rarely the additional wing is reduced to a reduplication of the wing of the disk through more or less a distance. The disk is covered on each of its sides with elevated ridges radiating more or less regularly from the centre. The whole seed is black.

XXXVIII.—*Characters of four Indian species of Cyclophorus, Montfort, followed by Notes on the Geographical Distribution of the Genera of the Cyclostomacea in Hindostan.* By W. H. BENSON, Esq.

1. *Cyclophorus altivagus*, nobis.

Testa angustissime umbilicata, fere perforata, globoso-conica, solida, striata, superne rufa, castaneo picta, subtus versus periomphalum albida; spira elevata, turbinata, acutiuscula; anfractibus $5\frac{1}{2}$ convexis, superne costis spiralibus sex munitis, ultimo rotundato, ad periphæriam vix carinato, basi lævigata, umbilico pervio; apertura vix obliqua, subovali-circulari, superne angulata, intus lutescente; peristomate duplici, interno continuo, valde porrecto, acuto, externo expansiusculo, costam fingente, superne anguste angulatum adscendente, ad anfractum penultimum late emarginato, margine columellari minime sinuato, supra umbilicum angustum dilatato-reflexo. Operc.?

Diam. major 31, minor 26, alt. $24\frac{1}{2}$ mill. Apert. intus 17 mill. longa, 15 lata.

Hab. in summis montibus Mahabuleshwar Indiæ Meridionalis. Describit A. E. Benson.

A single decorticate specimen was found by my son, Lieut. Arthur E. Benson, Tenth Royal Hussars, after the close of the rains of 1853, on the summit of the range of Ghauts overlooking the low tract in which *Cyclophorus Indicus* occurs. It differs from this species in its more elevated form, indistinct keel, rounded last whorl, more elongate aperture, porrect inner lip, the absence of any sinuosity in the plane of the aperture on the columellar lip, less expanded outer peristome, and by the greater expansion of the external columellar lip over the umbilicus, which is also much narrower; and permits no view of the internal whorls. The outer lip, at its junction with the last whorl, rises more suddenly to a point than in *C. Indicus*. It is probable that when in good condition the internal border of the aperture is of an orange colour. In the specimen before me I can find no trace of the close-set raised lines between the liræ which are present in all my specimens of *C. Indicus* from Elephanta and the Concan, however weathered. In one antiquated specimen of the latter, with a porrect superstructured inner peristome, this

part still preserves the expanded edge, so different from the sharp lip present in the mountain species.

2. *Cyclophorus pyrotrema*, nobis.

Testa umbilicata, turbinato-conica, solida, superne costis spiralibus, obtusiusculis, confertis, striisque obliquis confertissimis sculpta, castaneo albidoque fulguratim strigata et marmorata; spira conica, elevatiuscula, apice acuto. Anfractibus 5 convexis, ultimo fascia albida mediana, infra periphæriam obsolete angulatam fascia lata, subtus nonnullis aliis castaneis ornata; basi valde convexa circa umbilicum submediocrem pervium albida; apertura vix obliqua, irregulariter subcirculari, superne angulata, intus lactea vel cærulescente; peristomate duplici, breviter ad anfractum penultimum adnato, interno continuo, expansiusculo igneo, externo reflexiusculo albido, margine columellari sensim arcuato, fere verticali, subrevoluta, subsinuato. Operculo normali, tenui, pallide fusco, margine anfractuum elevatiusculo, scabro.

Diam. major 36, minor 30, alt. 26 mill.
 ————— 34, ——— 28, — 24 mill.
 ————— 26, ——— 21, — 18 mill.

Hab. ad Sikrigali et Patharghata, Bahar, et ad Rajmahal Bengalizæ.

In rupibus umbrosis et sub arboribus, inter folia emortua, annis 1831 et 1835, ipse detexi.

A variety occurs in which the shell is of a pale buff colour, darker towards the apex, the bands and markings being obsolete, and the colour of the peristome being equally vivid with that of the typical shells. Another thinner variety occurs, in which the interior coloured lip is not present.

Sowerby, in 1834, marked this species as *C. Involvulus*; however, the typical form of that species proves to be more depressed, the umbilicus more open, the aperture more rounded, with an orange interior, while in this species it is cærulean white or milky.

A description of the animal will be found in the last vol. of the 'Zoological Journal' under the name of *C. Involvulus*.

With a general resemblance in form to *C. Indicus*, Desh., it will be at once distinguished by the absence of a keel or acute spiral ribs, by the wider umbilicus, less developed peristome, and more elevated form. The very gradual arcuation of the columellar lip is also an essential character, detracting from the uniformity of the circular aperture. The sinus observable at this part, impinging on the plane of the aperture, is also conspicuous in *C. Indicus*.

3. *Cyclophorus Exul*, nobis.

Testa angustissime umbilicata, fere perforata, globoso-turbinata, tenui, undique lineis spiralibus vix elevatis, superne 8-9 valde obtusis,

striisque obliquis teneribus decussata; sub epidermide fusca, tenui, albida; superne castaneo flexuoso-strigata, fascia nulla mediana cincta; spira turbinata, apice obtusulo, rufescente, suturis distinctis. Anfractibus 5 convexis, ultimo rotundato. Apertura vix obliqua, subcirculari, superne angulata; peristomate simplici, tenui, expanso, reflexiusculo, vix continuo, margine columellari umbilicum non pervium subtegente.

Diam. major $25\frac{1}{2}$, min. 20, alt. 17 mill. Apert. intus 13 mill. longa.

Hab. ad Bhamoury, ad pedem montium Rohillano-Himalayanorum.

Detexit W. J. M. Boys.

This is the most northerly *Cyclophorus* known. It was discovered by the late Captain W. J. M. Boys, an indefatigable collector in several branches of zoology, and the discoverer of the genus *Boysia*, Pfr., by whose recent decease, as well as by that of Dr. J. F. Bacon, another Indian collector of great experience, science has sustained a severe loss.

This shell differs from the pale-lipped *C. pyrotrema*, in which the aperture is not fully developed, by its more globose form, ventricose last whorl, small impervious umbilicus, more regular sculpture above, stronger sculpture below, thinness, pale colour, and the absence of any medial fascia. From the pale-lipped variety of *C. Stenomphalum* with undeveloped peristome, it differs by the greater breadth of the aperture in proportion to its length, its non-pervious umbilicus, the absence of any carina at the periphery, the more closely sulcate and regular sculpture above, the extension of the sculpture on the under side into the umbilicus, its pale suite of colours, and by the absence of any colouring below the periphery. From *C. Indicus* it may be known by the absence of keel, suite of colours, sculpture, and aperture.

4. *Cyclophorus Tryblium*, nobis.

Testa subaperte umbilicata, depresso-turbinata, solida, superne costis 7-8 planulatis munita, albida, castaneo marmorata, subtus lævigata, versus periomphalum albida, fascia nigricante ad periphæriam ornata; spira turbinata, superne rubella, apice acutiuscula. Anfractibus 5 convexis, ultimo subdepresso, obsolete angulato, subtus valde convexo; umbilico profundo, infundibuliformi. Apertura vix obliqua, subcirculari, intus lutescente; peristomate subsimplice, continuo, breviter adnato, pallide aurantio, subincrassato, superne angulatim adscendente, margine dextro subrevoluto, columellari subexpanso, planato. Operc.?

Diam. major 47, minor 38, alt. 29 mill. Apert. intus 20 mill. longa.

Hab. ad Darjiling. Detexit H. Chapman.

I find a single specimen, not in fine condition, among shells kindly collected at my request by Dr. Chapman, to whom I was also indebted for the first known specimen of *Meg. funiculatum*.

It does not appear to have been detected by any subsequent collector in the environs of Darjiling. Nearly equal in size to *C. Himalayanus*, Pfr., from the same locality, it is distinguished from it by its form, depressed last whorl, wide umbilicus, sculpture, verticality of the angle at the upper part of the mediocre aperture, and by the colour of the peristome. There are indications of a broad light chestnut zone below the dark band at the periphery. The compressed character of the last whorl presents a strong contrast to the subglobose form of *C. Himalayanus* in that part.

—————

*Geographical Distribution of the Genera of the Cyclostomacea
in Hindostan.*

In the 8th vol. of the New Series of the 'Annals,' I attempted a view of the geographical distribution of the Indian species of *Cyclostoma* as then known to me. I am now able to add some species to the list, and it will prove interesting to exhibit the manner in which the different genera, as recognized by Pfeiffer, are distributed, from the Himalaya to Cape Comorin.

Cyclophorus, Montf.

Beginning with the largest and most extensively spread form, *Cyclophorus*, we find it at Darjiling in the Sikkim territory, occurring at an elevation of 7000 feet, under the gigantic types *C. Himalayanus*, Pfr., *C. Tryblium*, nobis, *C. Stenomphalus*, Pfr., the variety which I designated as *C. Aurora*, and the small widely umbilicated *C. Phenotopicus*, nobis. This region carries a subtropical vegetation to a great elevation. At some hundred miles to the west and north, at the foot of the Rohilkhund Himalaya, where a similar vegetation begins to give way to more European types, we find the outpost of the genus, in this direction, in *C. Exul*, nobis; and, as might be expected, the shell is dwarfed in size, light in structure, and modestly coloured. It may be remarked, in illustration, that *C. turgidus*, Pfr., is found near the Chinese coast, as high as Loochoo, in a parallel, however, less northerly than Bhamoury. The influence of a marine climate tells on that species in its superior solidity and colouring.

Crossing, to the eastward, the valley of Assam, and arriving at the group of mountains south and east of the Berhampooter river, we meet some fine forms in *C. eximius*, Mouss., *Pearsoni*, and *zebrinus*, nobis, *Stenomphalus*, and *Bensoni**, Pfeiffer; *C.*

* The habitat of this shell was unknown to Pfeiffer. I have the ordinary variety from the northern base of the Khasya hills, near Gowahatty, in the Assam valley. The specimens were kindly sent to me by Captain

milius, nobis, a dwarf species from the warm southern valleys, perhaps belongs to this type. Again traversing westerly the Gangetic plain of Bengal, *C. pyrotrema*, nobis, appears among the first rocks met with in the outlying portions of the Rajmahal range, where the stream of the Ganges makes a bend to the south; and the genus proceeds along the ranges, with a southerly tendency, towards the western side of the peninsula, skirting the north bank of the Nerbudda, and is represented by a fine new species, *C. Pirrieanus*, Pfr., in the Khoondah hills; by *C. stenomphalum* at Chyabasa in Singhboom; and at Mandoo, west of Indore, by a species not well ascertained, but which has been attributed, erroneously, to *C. Volvulus*, Müll., although widely differing from the Pulo Condore form. Traversing the river-valleys of the Nerbudda and Tapti, we find *C. Indicus*, Desh., inhabiting the warm region of the Concan (enclosed between the sea and the high Western Ghauts) and the adjacent islets.

A small species, from the description evidently new, and probably attributable to this type, was found near the ridge of these hills by Lieut. A. E. Benson, at the Caves of Karli, but unfortunately was broken and the fragments thrown away. This hint may assist in securing its detection when a conchologist may have an opportunity of visiting the spot. Still farther south, on the summits of the range at Mahabuleshwar, *C. altivagus*, nobis, adds another form to the genus; and at the expanded southern termination of the ridge, the Nilgherries present a rich series in *C. Nilagiricus*, *Jerdoni*, *caeloconus*, *cuspidatus**, and *ravidus*, nobis, and *Stenostoma*, Sow., the two last belonging, equally with the Darjiling *C. Phenotopicus*, to the planorbular type. It is to be remarked that *Cyclophorus*, after obliquely crossing Central India, is confined to the high ridge on the western side of the peninsula, and that no species has yet been discovered on the eastern coast, nor in the intermediate hills and plains, its place being partially supplied by other genera of the *Cyclostomacea*.

Alycaeus, Gray.

This is the most northerly and westerly genus of the *Cyclostomacea* in Hindostan. Its head-quarters appear to be in the Sikkim Himalaya, where *Al. constrictus* and *Al. Urnula*, nobis, inhabit Darjiling. To the north-west the genus is represented by *Al. strangulatus*, Hutton, in the sub-Himalayan ridges of

Rowlatt. An elegant variety has been sent from Chittagaon, in the north-east angle of the Bay of Bengal, in which the peristome is of a beautiful translucent yellowish-orange colour.

* A specimen of *C. cuspidatus* with the operculum shows that it belongs to *Cyclophorus*. Pfeiffer had placed it among the species *incertæ sedis*.

Kemaon, Sirmore, and as far as the banks of the Sutlej. The only other species known occurs in Cochin-China.

Megalomastoma, Guilding.

This form is confined to the Eastern Himalaya, and presents only two species, *M. funiculatum*, nobis, from Darjiling, and *M. pauperculum*, Sow., brought by Griffith from Bootan, to the north of the Assam valley. The nearest known point at which it again appears is Tavoy, where *M. sectilabre*, Gould, is met with. In Ceylon it is represented by eight different species of the allied form, *Cataulus*.

Pterocyclos, Benson.

Appears in the south-east angle of the Berhampooter river in *Pt. hispidus* and *parvus*, Pearson; again, across the plain of Bengal, in the Rajmahal range, we find the typical species, *Pt. rupestris*, nobis. Near the eastern coast of the peninsula, in the Northern Circars, the same species is repeated; and near Salem, and at the eastern foot of the Nilgherries, *Pt. bilabiatus*, Sowerby, and *nanus*, nobis, form a link with the Cingalese representatives of the genus.

Cyclotus, Guilding.

Occupies a subcentral zone. It was detected at Neemuch, to the north of the Nerbudda, in Southern Rajpootana, by Captain Hutton, in *C. semistriatus*, Sow., and the Dekkan habitat of the species cited by Sowerby has been lately verified by my son, who has taken it at Kirkee, a few miles from Poonah. A second species, *C. semidiscoideus*, Sow., (*aratus*, nobis), occurs in the Northern Circars, near the east coast of the peninsula*. It may be observed that the Cochin-Chinese species described and figured by Souleyet, in the 'Voyage of the Bonite,' as *Cyclostoma Tourannense*, and placed by Pfeiffer in the list of species only known to him by figures, is clearly to be referred to *Cyclotus* from the description of the operculum; although that accessory piece has apparently been exchanged, by the engraver of the plate, with the operculum of the Penang *Leptopoma* (*Cyclostoma*) *Garreli*, Soul.

Leptopoma, Pfeiffer.

I have no certain information of the occurrence of this genus in the tract under consideration. I have described two species

* The discovery of an operculum in a specimen of *Cyclostoma filocinctum*, nobis, from the Nilgherries, enables me to range it as a third species of *Cyclotus*, belonging to the same division as *C. substriatus*, Sow. The characters of the shell confirm the propriety of this location.

from Ceylon, and it probably extends to the peninsula. *Cyclostoma spurcum*, Grateloup, alleged to have been found near Bombay, is referred by Pfeiffer, with a mark of doubt, to *Leptopoma**; and the same author, on the authority of Mr. Cuming's collection, assigns a small variety of the widely-spread *L. vitreum*, Sow., to the Nilgherries; but the name of the finder is not recorded, and it has not been met with by Dr. Jerdon. Dr. Cantor took it on an islet near Penang; its occurrence on the mainland lying west of the Bay of Bengal requires confirmation.

Cyclostomus, Montf.

Dr. Pfeiffer assigns my species *C. tersum*, from the Khasya hills south-east of the Berhampooter, and my Nilgherry *C. filocinctum*† and *Trochlea* (the two first with marks of doubt), to this division. In the absence of opercula it is difficult to decide; but I am inclined to dissent from his judgment in regard to the two latter. It seems to me probable that *C. filocinctum* must eventually be referred to *Cyclophorus*; and *C. Trochlea* does not well agree with the species with which it has been associated. May it not be an *Omphalotropis*?

Another stray species from the southern base of the Khasya hills remains, viz. *Cyclostoma sarritum*, nobis, which, in the absence of the operculum, cannot well be determined; it is placed by Pfeiffer among the species *incerta sedis*. Its form is suggestive of *Cyclostomus*.

It will be seen, from the above enumeration, how rich in *Cyclostomacea* the tract under consideration is already proved to be. Thirty-six well-ascertained species inhabit it, and three others are indicated. When the valleys of Nipal (from the Ghagra to Sikkim), Bootan, the extensive jungle tract of Central India, and the extreme southern point of the peninsula, shall have been properly explored, we may expect interesting additions to the family. Most of the species enumerated have been made known only very recently, and every year adds several species to the catalogue.

Diplommatina, Bens.

If this genus should, on further examination (not of cabinet specimens, but of the animal in the shell), be proved, contrary to the experience of those who have observed the species in their native hills, to belong to the *Cyclostomacea*, three more species

* I find, on reference to the Monograph, that Pfeiffer includes it under *Opatoma*. A consideration of the characters leads me to the conclusion that its place will be found eventually in *Cyclotus*.

† Vide note on this species under the heading "*Cyclotus*." *Ann. & Mag. N. Hist.* Ser. 2. Vol. xiv 27

will require to be added to the list. All these inhabit the north-western portion of the Himalaya. Two of them may be found in company with *Alycaeus strangulatus*, wherever that little shell occurs. *D. Huttoni*, Pfr., is the most local, having only been taken at Simla, and at Jerripani below Mussoorie. *D. folliculus*, Pfr., and *costulata*, Hutt., are abundant in the whole region.

In conclusion, I must again advert to the total absence of the *Cyclostomacea* in the vast plains which extend from the mouth of the Indus round by the north of Delhi, and along the river system of the Ganges, to the head of the Bay of Bengal, cutting off from the Himalaya the central and southern mountain groups of the Indian peninsula; a deficiency attributable, in all probability, to the want of rocky shelter, inasmuch as every variety of aspect, from the most arid desert to a moist soil supporting the richest tropical vegetation, is present in the circuit. It must however be remarked, that in the sandstone tract, extending from the west of the Sone river to Delhi, which is generally of an arid character, and even where primary and igneous rocks are upheaved beneath them, as in Bundelkhund, no *Cyclostomatous* shell has rewarded the researches of myself and others.

Spa, Belgium, 13th November, 1854.

XXXIX.—Description of a new genus of Bivalve Mollusca.

By H. and A. ADAMS.

TYLERIA, H. and A. Adams.

SHELL oblong, equivalve; valves thin, nearly membranaceous, covered with a thin epidermis, rounded anteriorly, gaping and slightly produced posteriorly. Hinge composed of a cartilage-pit in each valve, cartilage internal, ligament partly external; a calcareous lamina extending from the cartilage-pit anteriorly, as far as the front muscular scar, supported in its length by calcareous septa and free anteriorly; pallial impression with slight posterior sinus.

The curious little shell on which this genus is founded, and which we have named *Tyleria fragilis*, was discovered, buried in sand, in the interior of other shells from Mazatlan, by R. W. Tyler, Esq., to whom we have dedicated the genus,—a gentleman well known as an enthusiastic conchologist and an indefatigable collector. The calcareous lamella is connected with the interior of the valves (for it is present in both) by means of vertical plates, which, being produced on each side, cause the lamella to assume a dentate appearance.

Royal Naval Hospital, Haslar.